Sample Question Paper
Subject: Physics.
Class – XII
Full Marks : 70 Time : 3 Hours

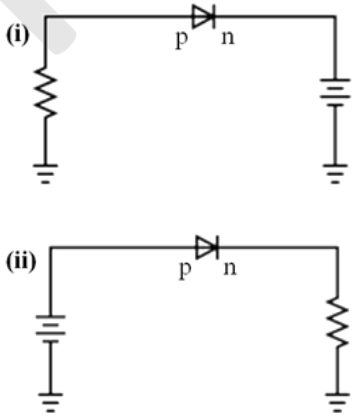
General Instructions

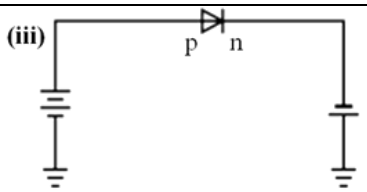
1) There are 33 questions in all. All questions are compulsory.
2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
3) All the sections are compulsory.
4) Section A contains sixteen questions, twelve MCQ and four assertion reasoning based of 1 mark each,
5) Section B contains five questions of two marks each,
6) Section C contains seven questions of three marks each,
7) Section D contains two case study-based questions of four marks each and
8) Section E contains three long answer questions of five marks each.
9) There is no overall choice. However, an internal choice has been provided in two questions in Section B, one question in Section C and all three questions in Section E. You have to attempt only one of the choices in such questions.
10) You may use the following values of physical constants where ever necessary
    i. $c = 3 \times 10^8$ ms^{-1}
    ii. $m_e = 9.1 \times 10^{-31}$ kg
    iii. $m_p = 1.7 \times 10^{-27}$ kg
    iv. $e = 1.6 \times 10^{-19}$ C
    v. $\mu_o = 4\pi \times 10^{-7}$ T mA^{-1}
    vi. $h = 6.63 \times 10^{-34}$ J s
    vii. vii.$\varepsilon_o = 8.854 \times 10^{-12} C^2 N^{-1} m^{-2}$
    viii. Avogadro's number = 6.023 X 10^{23} per gram mole

Q No.	Question	Marks
	Section - A	
1	An electric dipole placed in a non – uniform electric field can experience: (a) A force but not a torque. (b) A torque but not a force. (c) Always a force and a torque. (d) Neither a force nor a torque.	1
2	When area of cross – section of a conductor doubles the original area, the new resistance of the conductor: (a) Remains the same. (b) Increases by two times. (c) Decreases by half the original resistance. (d) Decreases by one-third of the original resistance.	1
3	According to Oersted, moving charges along a linear path will produce (a) Electric field which are concentric (b) Magnetic field around the path of the moving charges (c) Electric as well as magnetic field around the path (d) No electric or magnetic field	1

4	When electric current passes in a straight solenoid, the magnetic field is strongest: (a) Along the axis inside the solenoid (b) At the mid – point of the solenoid just outside it (c) At the end of the solenoid (d) At the end where the current enters the solenoid	1
5	Which of the following is a para – magnetic substance? (a) Aluminum (b) Copper (c) Iron (d) Nickel	1
6	The phase difference between the current and the voltage in series LCR circuit at resonance is (a) π (b) $\pi/_2$ (c) $\pi/_3$ (d) zero	1
7	The time taken by an AC of 50Hz for one cycle is : (a) 1×10^{-2} S (b) 2×10^{-2} S (c) 5×10^{-2} S (d) 1×10^{-3} S	1
8	Transmission of light in optical fibre is due to: (a) Scattering (b) Diffraction (c) Refraction (d) Multiple total internal reflection	1
9	Which of the following statement is true about the width of central diffraction maximum in a single slit diffraction pattern? (a) It increases when the width of the aperture increases. (b) It decreases when the width of the aperture increases. (c) It remains unchanged regardless of the aperture width. (d) It cannot be predicted from the aperture width.	1
10	In mass defect, which of the statement is true: (a) Mass of its constituent nucleons should remain the same as mass of nucleus. (b) Mass of its constituent nucleons should be more than mass of nucleus. (c) Mass of its constituent nucleons should be less than mass of nucleus. (d) Cannot be predicted about the mass of the nucleus.	1
11	In Alpha-particle scattering, the α – particles (a) Passes straight through the gold foil. (b) Are scattered in only one direction (c) Are scattered in all direction (d) Majority passes through the gold foil, some scattered at some angle and very few rebound backwards.	1
12	In forward bias, the width of potential barrier in a p-n junction diode.	1

	(a) Increases (b) Decreases (c) Remains constant (d) First increases and then decreases.	
	From question 13 to 16, two statements are given labeled Assertion (A) and other labeled Reason (R). Select the correct answer to these questions from the options given below: (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion. (c) Assertion is true but Reason is false. (d) Both Assertion and Reason are false.	
13	Assertion (A): No work is done in moving a test charge on an equipotential surface. Reason (R): Electric field through equipotential surface is always normal to the equipotential surface.	1
14	Assertion (A): When two thin convex lenses are co-axially in contact with each other, their combined power increases. Reason (R): Focal lengths of two or more lenses in contact are added up.	1
15	Assertion (A): Total energy of a revolving electron in any stationary orbit is negative. Reason (R): Energy can have positive or negative values.	1
16	Assertion (A): Two waves from two different sources are coherent as they have similar wave lengths. Reason (R): Two sources of waves having zero or constant phase difference are coherent waves.	1
	Section - B	
17	With the help of a circuit diagram, explain the use of a junction diode as a half wave rectifier.	1+1=2
18	State Kirchoff's laws.	2
19	What is a transformer? State its principle.	1+1=2
20	Using Ampere's circuital theorem, calculate the magnetic field due an infinitely long wire carrying current I at a distance r from the wire. or Write an expression for the force per unit length between two infinitely long straight parallel current carrying wires. Hence define one ampere.	2 1+1=2
21	Calculate the frequency of radiation emitted by electrons in hydrogen atom when they jump from 4^{th} orbit to 2^{nd} orbit. or Show that, $R = R_o A^{1/3}$, where symbols have their usual meanings,	2 2
	SECTION – C	
22	Arrange the following radiations in ascending order of their wave lengths: Radio waves, ultraviolet rays and x – rays.	1+2=3

	Write one useful application of any two radiations.	
23	Draw a circuit diagram showing a wheatstone bridge. Use Kirchoff's Laws to obtain the balance condition in terms of the resistance of four arms of wheatstone bridge. or With the help of a diagram, show that the reciprocal of equivalent internal resistance for two cells connected in parallel with each other is the sum of the reciprocal of the individual internal resistances of the two cells.	3 3
24	Calculate the binding energy per nucleon for $_{30}Zn^{64}$ [Take 1amu = 1.66 X 10 $^{-27}$ kg, Mass of proton = 1.00728 amu, Mass of neutron = 1.00867 amu, Mass of $_{30}Zn^{64}$ = 63.9423 amu].	3
25	Find a relation between *u, v,* R, μ_1 and μ_2 in the case of refraction from denser to rarer medium through a convex spherical surface.	3
26	Prove the laws of refraction by applying Huygens' Principle when a plane wavefront propagates from one medium to another medium and is incident at an angle *i*.	3
27	Derive an expression for the electric field at any point on the axial line of an electric dipole.	3
28	Write the relationship between magnetic moment of a current carrying loop and current. Use this expression to derive the magnetic di-pole moment of a revolving electron.	1+2
	SECTION - D	
29	A student performs an experiment on a metal that is photo-sensitive. He keeps the frequency of light constant and changes its intensity from I_1 to I_2 to I_3 ($I_3 > I_2 > I_1$). He then plots a graph of photo current versus collector potential. (a) Plot the graph that he would have got for all three intensities. (b) How does stopping potential depend on intensity of incident light? (c) What actually changes in the incident light when intensity changes?	1+1+2=4
30	In the following diagrams, p-n junction diodes have been biased by applying voltages to the p- side and n- side. 	1x4=4

	(iii)  (a) Which of the above circuit(s) is / (are) forward biased? (b) Which circuit(s) have the largest flow of current? (c) Which circuit(s) is /(are) reverse biased? (d) In which circuit(s) no current will flow?	
	SECTION – E	
31	(a) Derive the electric field outside and inside a uniformly charged thin spherical shell. (b) An electric di-pole with dipole moment 4 x 10^{-9} C–m is aligned at 30º with the direction of uniform electric field of magnitude $5x10^4$ NC^{-1}. Calculate the magnitude of the torque acting on the dipole. OR (a) Derive an expression for electric potential at any point at a distance *r* from the mid-point of a dipole. (b) Two charges 2 x 10^{-8} C and -3 x 10^{-9} C are located 16 cm apart from each other. Calculate the potential energy of this system of two charges.	3+2=5 3+2=5
32	Draw a graph to show the variation of the angle of deviation (δ) with the angle of incidence (*i*) for a monochromatic ray of light passing through a prism of refracting angle A. Deduce the relation $\mu = \frac{Sin[\frac{A+\delta m}{2}]}{Sin(\frac{A}{2})}$ Or With the help of a labeled diagram of a compound microscope, derive the magnification when final image is formed at the least distance of distinct vision.	2+ 3=5 2+3=5
33	Derive the torque on a rectangular loop carrying-current placed in a uniform magnetic field. Draw a suitable diagram. Write one application of this principle. Or Derive the expression of magnetic field at any point on the axis of a current-carrying circular loop by using Biot – Savart's Law. Find the magnetic field at: (a) A point far away from the axis. (b) At the centre of the loop.	4+½+½ = 5 2+1½+1½=5

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Blueprint Physics- Class XII						
Units	1 mark 1x16=16	2 Marks (VSA) 2x5-10	3 marks (SA) 3x7=21	4 marks Case study 4x2-8	5 marks (LA) 5x3=15	Total unit-wise
1	1(2)		3(1)		5(1)	16(7)
2	1(1)	2(1)	3(1)			
3	1(3)	2(1)	3(1)			17(9)
4	1(2)	2(1)			5(1)	
5			3(1)			18(8)
6	1(4)		3(2)		5(1)	
7				4(1)		12 (6)
8	1(3)	2(1)	3(1)			
9	1(1)	2(1)		4(1)		7 (3)
Total Q-type	16(16)	10(5)	21(7)	8(2)	15(3)	70 (33)